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Performance of different herbicide in weed growth of chickpea (*Cicer arietinum* L.)

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ABSTRACT

An experiment was conducted during winter (*Rabi*) seasons of 2005-06 and 2006-07 to study the response of weeds on chickpea (*cicer arietinum* L.) to various seed rate (75, 100 and 125 kg ha^{-1}), row spacing (30 and 45 cm) and weed management practices (weedy check, two hand weeding at 30 and 45 DAS, pre-emergence application of pendimethalin @ 0.5 kg a.i. ha^{-1} with one hand weeding at 30 DAS and application of metribuzin @ 250gm a.i. ha^{-1} with one hand weeding at 30 DAS). The combination of seed rate 100 kg ha^{-1}, row spacing 45 cm and pendimethalin @ 0.5 kg ha^{-1}+ one hand weeding at 30 DAS reduced total weed density and weed dry matter (g/m^{-2}) at various stages of crop growth during both the years.

Key words : Chickpea, Weed, Herbicide, Weed management, Metribuzin, Pendi methalin

INTRODUCTION

Among the winter season pulses, chickpea (*Cicer arientinum* L.) is the most important crop accounting for 51% of total area and 54% of total production of all winter pulses production in the country was 13.11 million tones from 22.23 million hectare area with an average yield 600-650 kg ha^{-1}(Ali and Kumar, 2007). India produces 68% and 75% of total production of chickpea in world and Asia, respectively. *Chenopodium album* as the most dominating weed in chickpea and caused maximum reduction in the grain yield Malik *et al*. (1988). Out of several factors responsible for low productivity of chickpea, losses caused due to weeds are of the most important which averaged out to be 94.7% (Ali, 1993). Row spacing 30 cm reduced weeds dry weight of chickpea in comparison to 45 cm row spacing. Wider row spacing 45 are produced significantly higher grain yield than narrow row spacing 30 cm Singh *et al*. (2003).

Seed rate, row spacing and weed management practices are of considerable importance, as these affect availability of moisture, nutrient and sun –light influence, growth and yield of plants. It has been established that magnitude of losses due to different types of weeds flora is vary considerably. The major weeds were reported as *Chenopodium album*. *Melilotus indica* L.*, Mililotus alba* L.*, Cyprus rotundus* which posed competition for growth resources and have been found to reduce the yield of chickpea crop to the extent of 63 per cent (Tewari and Tewari, 2002). In order to manage the weed problem, importance of herbicide has already been recognized. The present experiment practices were planned and conducted to work out optimum seed rate, row spacing and weed management practices for effective weed control on chickpea.

MATERIALS AND METHODS

The experiment was conducted during the winter seasons of 2005-06 at Crop Research Centre of Sardar Vallabh Bhai Patel University of Agriculture and Technology, Meerut (U.P). The field study was planned and laid out in split plot design with 6 main plots (combination of 3 seed and 2 row spacing) and 4 sub plots (weed managements options). Chickpea was sown in the second fortnight of November and was harvested in the second fortnight of March. The experimental soil was low in organic carbon and medium in available P and K. During crop growth total amount of rainfall received was 11.67 mm in 2005-06 and 65.7mm in 2006-07. Maximum and minimum temperature ranges were 31.15^{0}C and 30.06^{0}C and 3.01^{0}C and 3^{0}C, respectively. Chickpea variety Sadbhawana was planted by pora method. Soil of the experimental site has been classified as sandy loam. Field was drained and leveled. Soil samples were collected from 10 different places in the experimental field as to draw a representative composite homogenous sample for determining the phsico-chemical properties of the soil. A basal dose of 25 kg nitrogen through urea and 60 kg single super phosphate and 25 kg $ZnSO_4$was applied uniformly to all plots. The height of 5 plants were measured from ground surface to the top of the main shoot at 30, 60, 90, DAS and at harvest. The value was averaged and expressed as height/plant (cm). The number of branches

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were recorded on the above five plants and expressed as branches/plant. The number of branches on five tagged plants were counted at 60, 90 DAS and at harvest.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized below:

Plant height :

It is evident from the data (Table 1) that plant height was significantly influenced by the seed rate at all the crop growth stages in both the years of experiment. Plant height of crop was slow from sowing to 60 DAS. Increase in plant height was rapid from 90 DAS and thereafter, the height of crop was slow. Higher seed rate 125 kg ha^{-1} gave significantly more plant height, which was at par with 100 kg seed rate ha^{-1}. With seed rate 100 kg ha^{-1} produced taller plants than lowest seed rate (75 kg ha^{-1}) at all the crop growth stage in during both years. Kumar (1984) and Singh and Singh (1998) also reported similar results in favour of taller plants. However, at maturity, maximum plant height was observed in 45 cm row spacing and lowest plant height was found at 30 DAS in both the experimentation period. This is supported by the Patil and Ali (1988).

All weed management treatment brought about significant increase in plant height over weedy check at various stages of plant growth which was significantly higher at all the stages except 30 DAS due to application of pendimethalin @ 0.5 kg a.i. ha^{-1} followed by metribuzin @ 250 gm a.i. ha^{-1}+ one hand weeding at 30 DAS and two hand weeding during both the year of experimentation. At 60 DAS stages, significantly higher plant height was recorded in pendimethalin @ 0.5 kg a.i. ha^{-1} followed by metribuzin @ 250 gm a.i. $ha^{-1}$with one hand weeding at 30 DAS during both the years.

At 90 DAS stages, all weed management treatment like two hand weeding and pre-emergence application of pendimethalin @ 0.5 kg a.i. ha^{-1} metribuzin @ 250 gm a.i. ha^{-1} significantly influenced the plant height over weedy check during both the years. At harvest stage pre-emergence application of pendimethalin @ 0.5 kg a.i. ha^{-1} with one hand weeding at 30 DAS being at par with metribuzin @ 250 gm a.i. ha^{-1}+one hand weeding significantly affected plant height. However, pre-emergence application of pendimethalin @ 0.5 kg a.i. ha^{-1} with one hand weeding recorded higher plant height as compared to weedy checks plots during both the years. Similar, observations were also reported by Singh *et al.* (2003) and Chaudhary *et al.* (2005).

Table 1 : Plant height (cm) as influenced by seed rate, row spacing and weed management at various stages of crop growth

Treatments	Plant height (cm)							
	30 DAS		60 DAS		90 DAS		At harvest	
	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07
Seed rate (kg/ha)								
75	9.95	10.10	16.02	16.51	37.88	39.09	40.84	41.96
100	10.12	11.15	18.82	19.36	40.79	41.92	43.11	44.30
125	10.18	11.20	19.23	19.87	41.98	42.71	45.09	45.28
S.E.±	0.11	0.13	0.19	0.21	0.45	0.47	0.46	0.51
C.D. (P=0.05)	0.33	0.39	0.57	0.62	1.34	1.40	1.35	1.52
Row spacing (cm)								
30	9.94	10.12	17.51	18.14	39.37	40.37	42.21	43.25
45	10.30	11.20	18.94	19.01	41.07	42.11	43.81	44.90
S.E.±	0.09	0.10	0.16	0.18	0.37	0.38	0.37	0.41
C.D. (P=0.05)	0.27	0.30	0.46	0.51	1.10	1.14	1.10	1.24
Weed management								
Weedy check	9.83	10.20	14.09	14.51	30.28	31.36	33.24	34.14
Two hand weeding	10.01	11.36	17.28	17.88	40.05	41.09	43.40	44.27
Pendimethalin @ 0.5 kg/ha + one hand weeding	10.12	11.00	20.72	21.35	46.02	47.02	49.24	50.25
Metribuzin @ 250 g a.i/ha + one hand weeding	10.65	11.35	20.01	20.57	44.53	45.50	46.19	47.64
S.E.±	0.13	0.15	0.26	0.28	0.61	0.62	0.57	0.68
C.D. (P=0.05)	0.39	0.45	0.73	0.79	1.76	1.77	1.64	1.94

Table 2 : Number of nodules/plant as influenced by seed rate, row spacing and weed management at various stages of crop growth

Treatments	Number of nodules per plant					
	45 DAS		90 DAS		120 DAS	
	2005-06	2006-07	2005-06	2006-07	2005-06	2006-07
Seed rate (kg/ha)						
75	13.41	13.96	17.65	18.18	7.52	7.58
100	12.98	13.63	16.98	17.29	6.67	6.34
125	12.04	12.21	14.17	15.50	5.58	5.61
S.E. ±	0.17	0.18	0.20	0.20	0.09	NS
C.D. (P=0.05)	0.49	0.51	0.60	0.60	0.27	NS
Row spacing (cm)						
30	12.09	12.31	15.86	16.05	6.19	5.98
45	13.54	14.02	16.68	17.93	6.99	7.04
S.E. ±	0.14	0.15	0.16	0.17	0.07	NS
C.D. (P=0.05)	0.41	0.42	0.49	0.50	0.22	NS
Weed management						
Weedy check	8.93	9.10	11.15	11.48	4.21	4.24
Two hand weeding	12.33	12.60	14.00	14.30	7.25	6.83
Pendimethalin @ 0.5 kg/ha + one hand weeding	16.07	16.35	20.46	22.23	8.68	8.74
Metribuzin @ 250 g a.i/ha+ one hand weeding	13.93	14.60	19.46	19.93	6.23	6.24
S.E. ±	0.22	0.23	0.28	0.30	0.11	NS
C.D. (P=0.05)	0.64	0.65	0.81	0.85	0.33	NS

NS = Non significant

Number of nodules :

With increased seed rate from 75 to 125 kg ha^{-1} consistently brought significant decreases in number of nodules per plant during both the years at different stages of crop growth (Table 2). The nodules per plant increased up to 60 DAS, and highest number of nodules recorded at 60 DAS. At 75 DAS significantly reduction of nodules per plant was observed in different seed rate. Seed rate 75 kg ha^{-1} increased the nodules number per plant significantly over 100 kg ha^{-1} seed rate. Similarly, seed rate @ 100 kg ha^{-1} brought about significantly increase over 125 kg ha^{-1}. Similar observations were also reported by Jain. (2002) and Vaishya *et al.* (1995). However, wider row spacing (45 cm) resulted highest number of nodules per plant at 60 DAS in both the years. Patil and Ali (1988) reported similar results.

At 45 and 60 DAS stages, application of pendimethalin @ 0.5 kg ha^{-1} with one hand weeding at 30 DAS significantly increased the nodules per plant which was at par with metribuzin @ 250 gm a.i. ha^{-1}+one hand weeding at 30 DAS. Two hand weeding at 30 and 45 DAS also significantly increased the nodules per plant as compared to weedy check in both the years. Lowest number of the nodules per plant was noted from weedy check during both the years. At 75 DAS stage pre-emergence application of pendimethalin @ 0.5kg a.i. ha^{-1} being at par with metribuzin @ 250 gm a.i. ha^{-1}+one hand weeding at 30 DAS, significantly decreased the nodules per plant as compared to two hand weeding and weedy check during both the years. Similar, observations were also reported by Singh *et al.* (2003) and Chaudhry *et al.* (2005).

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